April 7, 1959 M. A. FRENKEL ET AL 2,880,539

DECAL STAMPING MACHINE

Filed Feb. 2, 1956 5 Sheets-Sheet 1

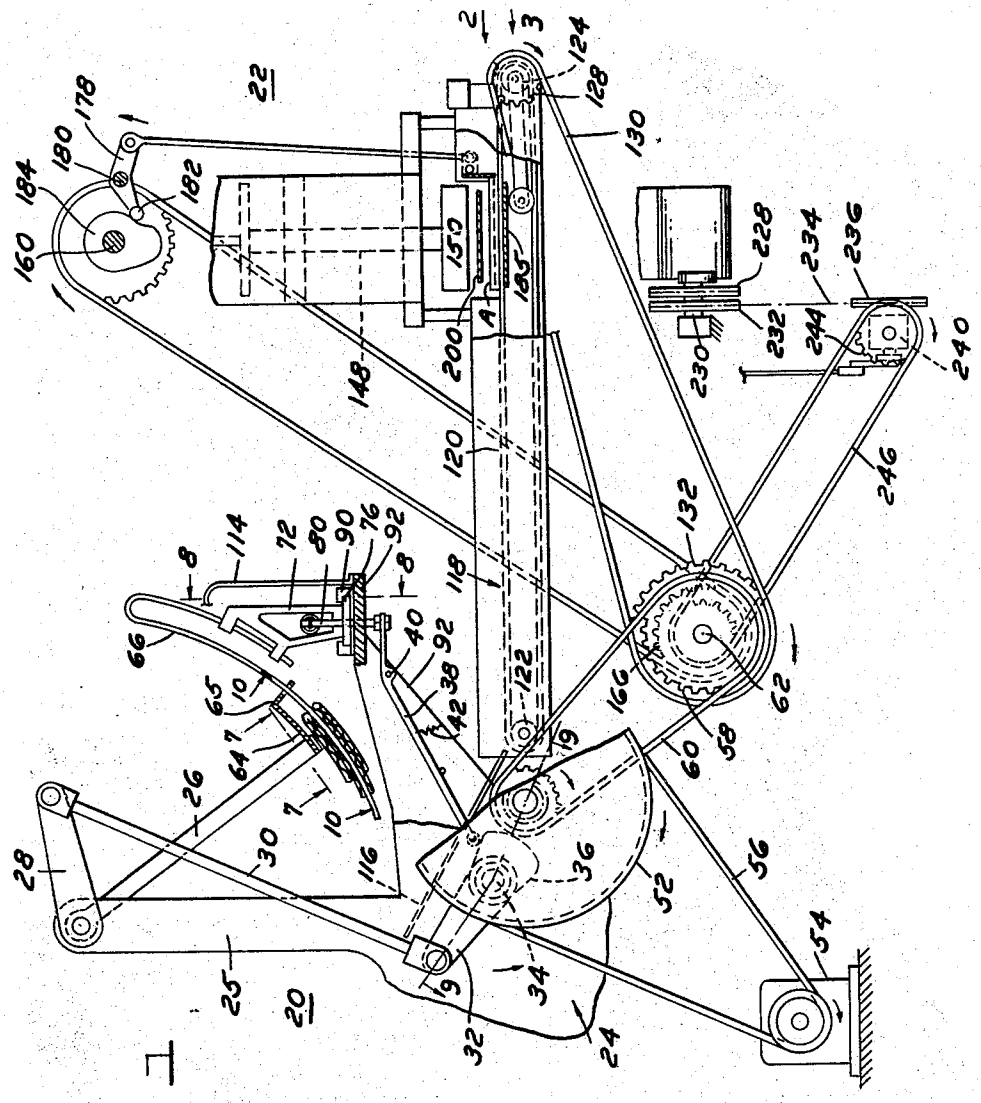


FIG. 1

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FIG. 2

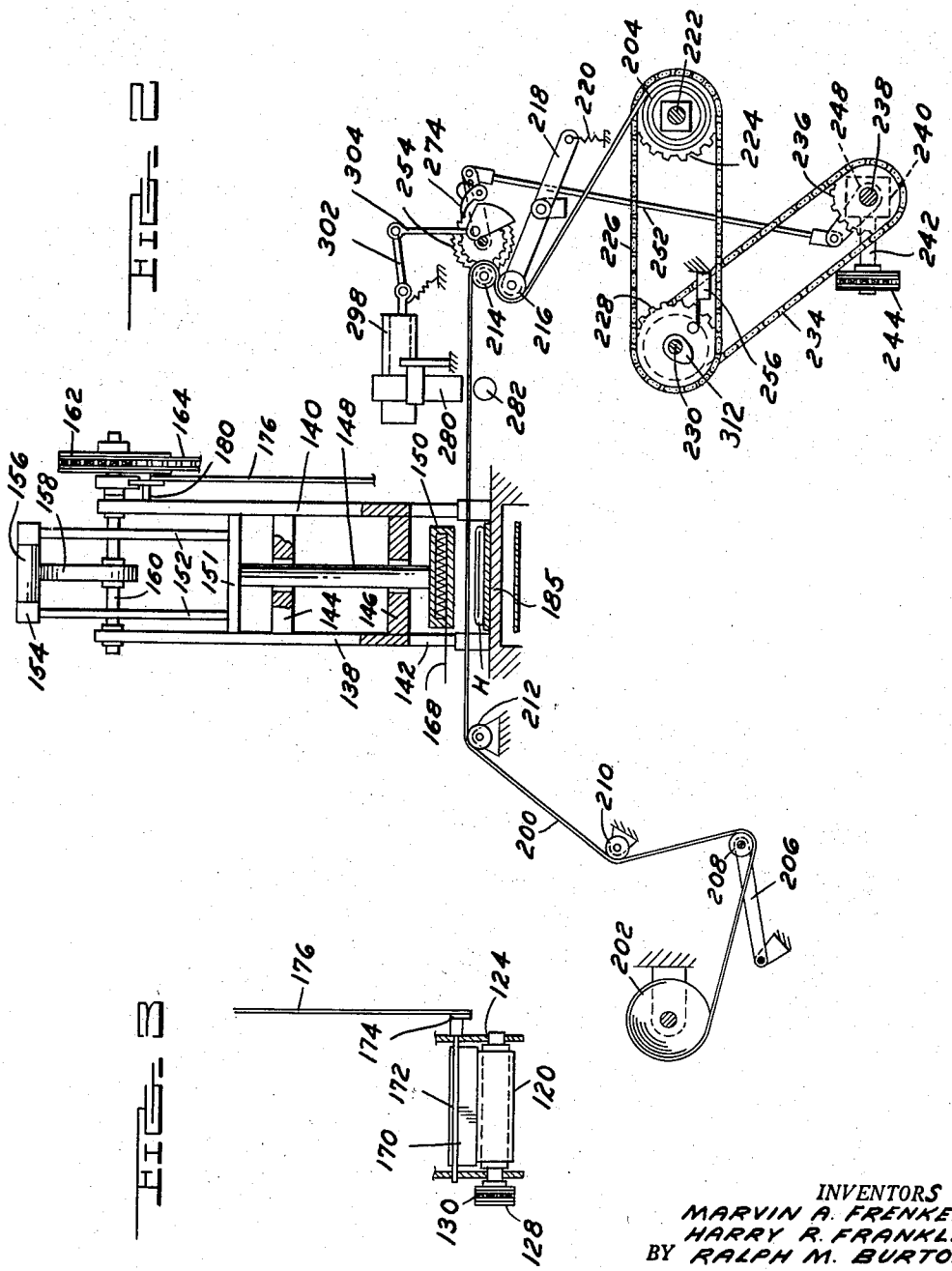


FIG. 3

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DECAL STAMPING MACHINE

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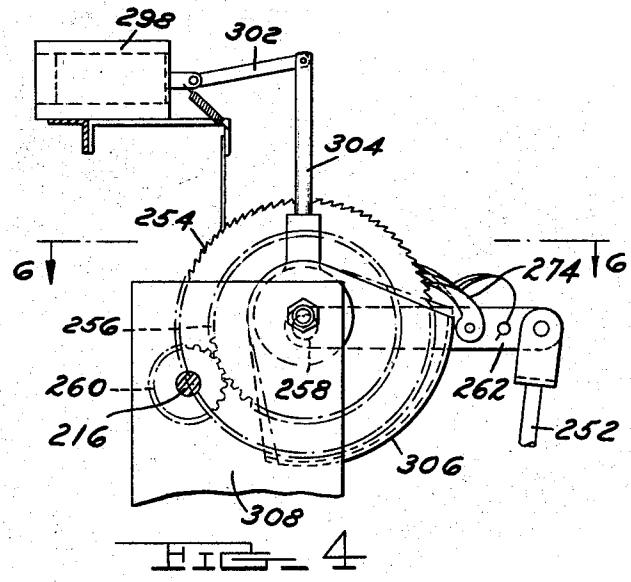


FIG. 4

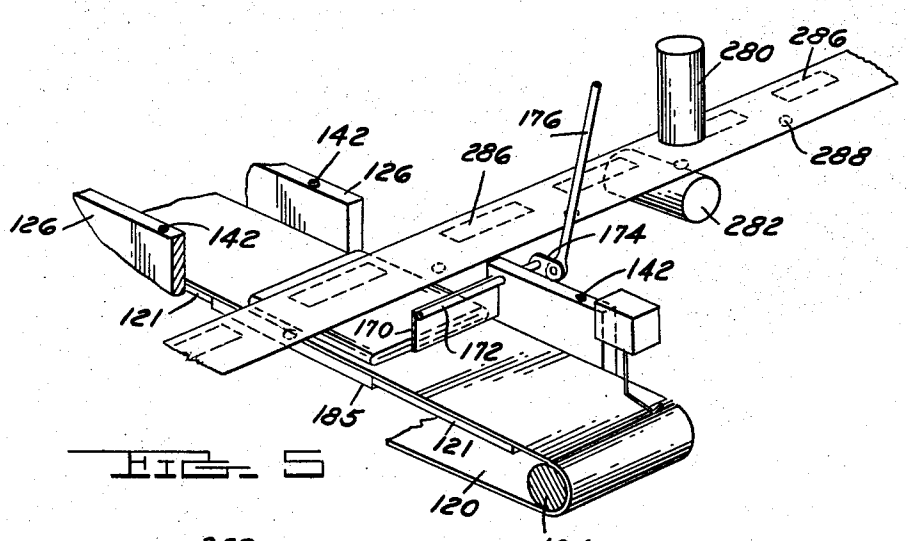


FIG. 5

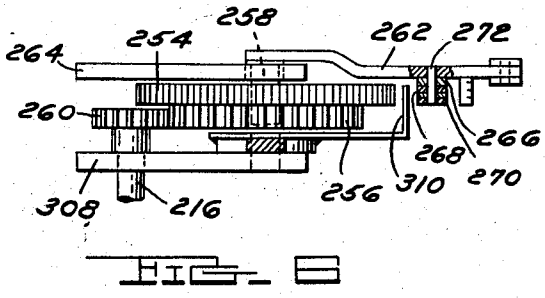


FIG. 6

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DECAL STAMPING MACHINE

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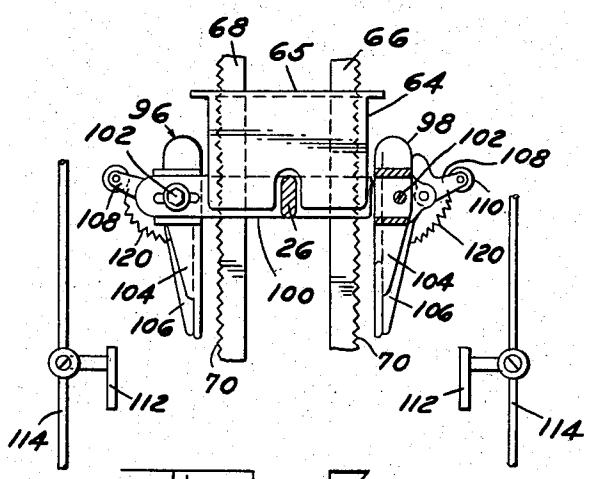


FIG. 7

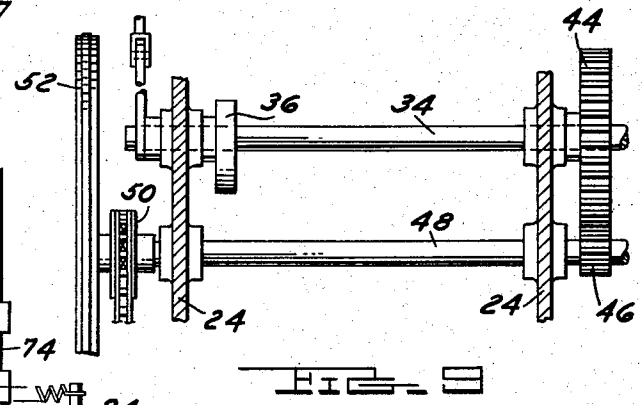


FIG. 9

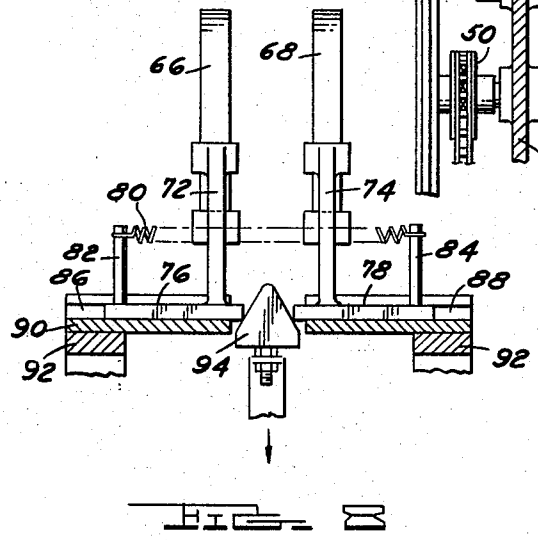


FIG. 8

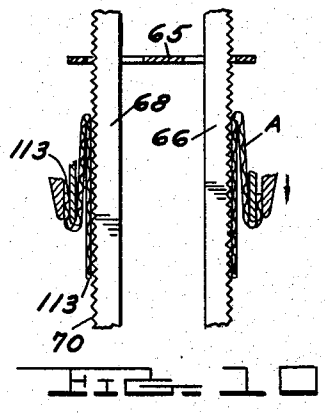


FIG. 10

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FIG. 12

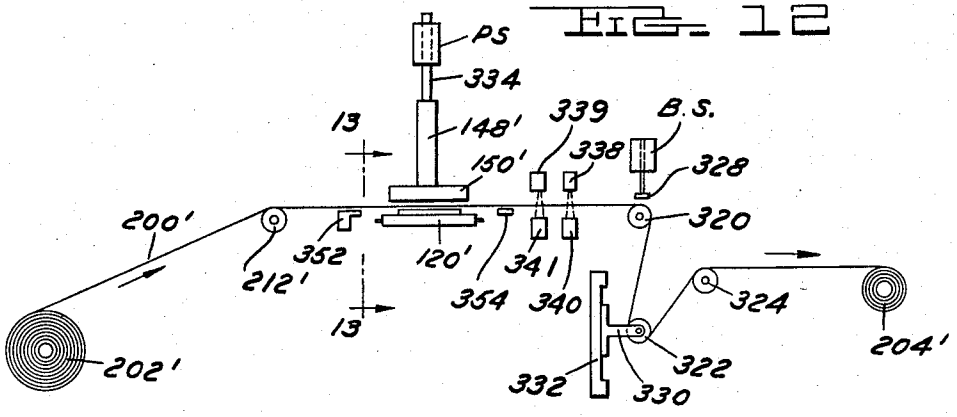
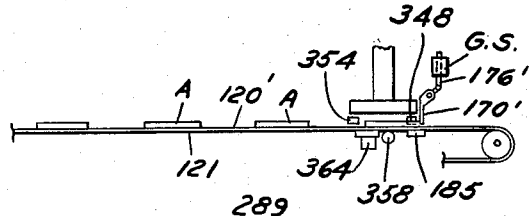


FIG. 13



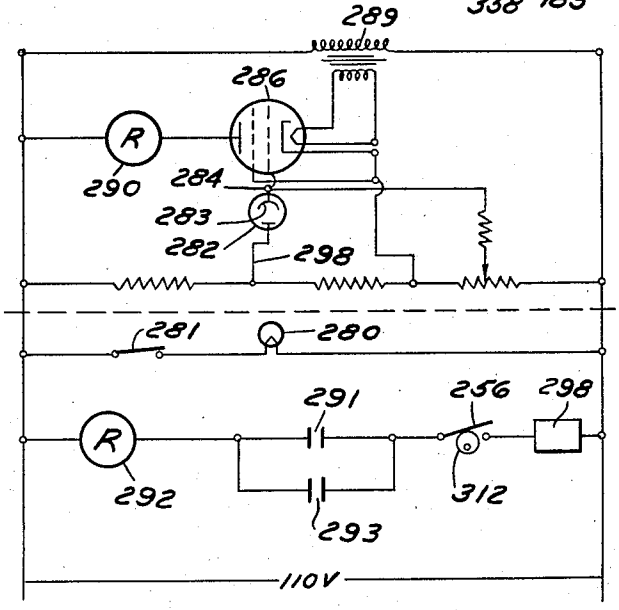


FIG. 11

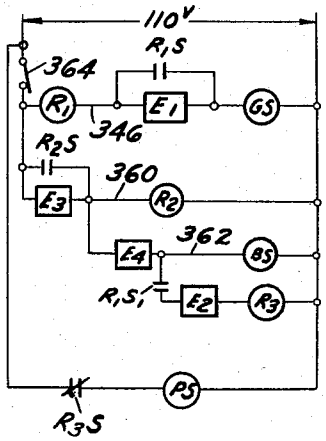


FIG. 14

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United States Patent Office 2,880,539 Patented Apr. 7, 1959

2,880,539

DECAL STAMPING MACHINE

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Application February 2, 1956, Serial No. 563,020

10 Claims. (Cl. 41—1)

This invention relates to a decalcomania transfer or stamping machine and particularly to a machine for automatically transferring or stamping decalcomania from a carrier ribbon to a succession of articles moving along a conveyor.

The invention is shown as embodied in a device for imprinting decalcomania upon a succession of glove cuffs as they are discharged from a cuff-forming machine. However, it will become apparent that the invention may be readily adapted to many other machines for imprinting cloth or the like articles formed thereby, and I do not wish or intend to limit its application to cuff-forming machines.

The invention is particularly well suited for use in an automatic article-handling system to serve to stamp and desired marking, such as a trademark, on articles passing through the system. In carrying out the invention each article of a succession of articles moving along on an article conveyor is imprinted with a decalcomania, hereinafter termed a decal, from a decal carrier ribbon traveling above the article conveyor. Means are provided for heating and pressing successive decals on the ribbon against successive articles on the conveyor. Other means are provided for registering a decal on the ribbon with the means serving to heat and press the decal against the article. Means are provided for interrupting the travel of that article on the conveyor to be stamped, and at the time of stamping, the means for heating the decals serves to interrupt the movement of the conveyor during the transfer. Following the transfer of the decal the conveyor is again started, and the imprinted article permitted to move on the conveyor toward the next handling operation.

An object of the invention is the provision of an automatic decal stamping or transfer machine provided with an article conveyor upon which articles are successively fed into a stamping or transfer station, with the station having a movable heated platen therein beneath which and between which and articles on the conveyor a decal tape or ribbon passes, with means for timing the operation of the platen with the positioning of an article in the station, to effect downward movement of the platen against the tape to carry the tape against the article to stamp the article in the station.

Another object of the invention is the provision of means to time the movements of the decal tape and platen such that prior to the stamping operation of the platen a decal on the tape is properly positioned therebeneath.

Another object of the invention is the provision of means for interrupting the movement of an article on the conveyor and holding the article arrested during the stamping operation, and thereafter releasing the article for continued movement on the conveyor.

Another object of the invention is the provision of means coupled with the tape for intermittently driving the same, and which means includes a decal position-

sensing device of such character that the improper positioning of a decal beneath the platen is detected and corrected when succeeding decals are positioned beneath the platen.

Another object of the invention is the provision of means for actuating the heated platen such that the movement of the platen toward articles on the conveyor is by force of gravity. A concomitant object of the invention is the provision of a slip clutch drive for the conveyor with the weight of the platen on an article on the conveyor being sufficient to exceed the frictional limitation of the clutch and thereby interrupt movement of the conveyor.

Other objects, advantages, and meritorious features will more fully appear from the specification, claims, and accompanying drawing, wherein:

Fig. 1 is a side semi-diagrammatic view of a glove cuff forming machine showing our decal imprinter coupled thereto;

Fig. 2 is an end view, partially in section, and with parts removed for clarity, of our decal imprinter looking in the direction of arrow 2 of Fig. 1;

Fig. 3 is an end view, partially in section, of the article conveyor looking in the direction of arrow 3 in Fig. 1;

Fig. 4 is a detailed view of the decal ribbon position-correcting mechanism shown generally in Fig. 2;

Fig. 5 is a perspective view showing the relationship between the article conveyor and the decal ribbon at their point of intersection;

Fig. 6 is a cross sectional view taken on the line 6—6 of Fig. 4;

Fig. 7 is a cross sectional view taken on the line 7—7 of Fig. 1;

Fig. 8 is a cross sectional view taken on the line 8—8 of Fig. 1;

Fig. 9 is a cross sectional view taken on the line 9—9 of Fig. 1;

Fig. 10 is a cross sectional view taken on the line 10—10 of Fig. 1;

Fig. 11 is a schematic view of the electric control circuit of our decal imprinter;

Fig. 12 is a schematic view of a modification of our stamping machine;

Fig. 13 is a view taken along the line 13—13 of Fig. 12; and

Fig. 14 is a schematic view of the electric circuit of the modification shown in Figs. 12 and 13.

A cuff-forming machine 20, with which our improved decal imprinter 22 is illustrated as being coupled, is shown in part schematically in Fig. 1 with certain parts thereof shown in greater detail in Figs. 7–10. The cuff-forming machine is illustrated for the purpose only of showing a part of an article-handling system which serves to supply a succession of articles to be fed into our improved decal imprinter. The cuff-forming machine is shown in detail in U.S. patent of Greeson, No. 1,154,581, issued September 27, 1915.

Cuff-forming machine

The cuff-forming machine 20 includes a frame 24, shown in Figs. 1 and 9, to an upstanding portion 25 of which is pivotally connected an angularly downwardly extending arm 26. A lever 28 connected to the upper end of arm 26 is adapted to pivot the arm in an arcuate motion. The outer end of lever 28 is connected by means of a rod 30 to a lever 32 mounted on a shaft 34 which is supported in the frame 24. Mounted on shaft 34, to rotate therewith, is a cam 36 shown in Fig. 9, adapted to actuate one end of the arm 38, pivoted as at 40 to the frame 24. A spring 42 is connected to rocker arm

38 and to the frame to tension the arm downwardly as shown in Fig. 1. Also mounted upon shaft 34 at that end thereof opposite the crank 32 is a gear 44 adapted to mesh with a pinion gear 46 mounted on shaft 48.

Shaft 48 is supported in the frame 24. At the opposite end of the shaft from pinion gear 46 are a pair of chain sprockets or the like 50 and 52. Entrained over sprocket 52 and connected to an electric motor or the like 54 is a drive chain 56. The electric motor 54 is adapted to drive sprocket 52 in the direction of the arrow in Fig. 1. Entrained over sprocket 50 and connected to sprocket 58 is a chain drive 60. Sprocket 58 is mounted on shaft 62 which may be supported in any convenient manner in the frame of our improved decal imprinter, and forms a part of our imprinter. It is apparent that upon rotation of pulley 52, sprocket 58 will be driven in the direction of the arrow in Fig. 1.

Connected to the lower end of rod 26, as shown in Figs. 1 and 7, is a generally L-shaped bracket 64, the depending leg 65 of which is slotted to be received over the arcuately shaped cuff guide arms 66 and 68 which are serrated along their outer edges as at 70. The depending leg 65 is adapted to travel over guides 66 and 68 and serves to urge a glove cuff therealong as hereinafter described.

The arcuately shaped cuff guide arms 66 and 68 are mounted upon a pair of upstanding brackets 72 and 74. The brackets are mounted upon a pair of slidable plates 76 and 78 which are tensioned toward each other by a spring 80, the opposite ends of which are connected to upstanding pins 82 and 84 mounted respectively upon plates 76 and 78. The plates 76 and 78 are carried for slidable movement in guideways 86 and 88 formed in a member 90 which rests upon the laterally extending portion 92 of frame 24. Because the arcuate cuff guide arms are mounted on slidable plates 76 and 78, they may be shifted laterally toward and away from each other.

To effect the shiftable movement of the cuff guide arms, a wedge-shaped cam 94 is mounted upon the end of rocker arm 38. As cam 36 on shaft 34 revolves, the lower end of rocker arm 38 is raised and lowered, thereby effecting a reciprocating motion of cam 94 and causing the slide plates 76 and 78 to be moved toward and away from each other. Cam 94 serves to wedge the plates apart. Upon withdrawal of the cam, spring 80 serves to move the plates toward each other and effect a closing of arms 66 and 68. As shown in Fig. 10, the slots in depending leg 65 of the L-shaped member 64 are of such lateral dimension that opening and closing of arms 66 and 68 is permitted.

Not shown, but lying to the left of upstanding portion 25 of frame 24, as viewed in Fig. 1, is a tubular cuff stock receiving guide and a cuff-shearing mechanism, and more particularly described in said Greeson patent. The cuff guide and shearing mechanism serve to receive a length of tubular cuff stock and shear the same at spaced apart points to form lengths of tubular cuff material. These lengths of tubular cuff material are formed one after another and are picked up immediately after formation and drawn over guide arms 66 and 68. In order to engage the tubular cuff stock and draw it over the guide arms 66 and 68, and also to effect a folding of the stock to form a folded cuff of double thickness, a pair of cuff-engaging finger assemblies 96 and 98 is provided at the lower end of rod 26. Such assemblies are shown in Figs. 7 and 10 at 96 and 98 and are mounted upon opposite ends of a laterally extending member 100 connected to rod 26 immediately below the L-shaped member 64.

The finger assemblies are mounted on member 100 by means of bolts or the like 102. Each finger assembly includes a pair of cooperable fingers 104 and 106. Fingers 104 are fixed while fingers 106 are pivotable laterally with respect to fingers 104.

In order to effect pivotal movement of fingers 106 of each pair 96 and 98, laterally extending cam followers 108 having rollers 110 at their outer ends are pivoted as at 111 to the finger assembly. The rollers are adapted to abut cams or guides 112 mounted on frame portions 114 of the machine. As viewed in Fig. 7, upon movement of the rod 26 downwardly, the rollers 110 of the cam followers will engage cams 112 and cause fingers 106 to pivot laterally outwardly from fixed fingers 104. A pair of cams similar to cams 112 and disposed farther downwardly along frame portions 114 as viewed in Fig. 7, are so disposed as to open the fingers when the arm 26 is at the lower end of its arcuate movement, and at this instant, the leading edge of a piece of tubular cuff stock is presented to the fingers by the cuff-shearing and guiding mechanism located to the left of upstanding portion 25 of frame 24. Upon reversal of movement of arm 26 the fingers draw the tubular stock with them up over the guide arms 66 and 68 and when the fingers reach the upper limit of their travel, the guide arms are opened by means of wedge cam 94 being inserted between plates 76 and 78. The serrated edges 70 of guides 66 and 68 engage the cuff stock, indicated at A, as shown in Fig. 10, and upon reversal of movement of arm 26 the cuff is folded downwardly upon itself to form a cuff of double thickness. When the cuff has been folded to the extent approximately shown in Fig. 10, the rollers 110 of the cam followers 108 again engage cams 112 shown in Fig. 7 and the fingers are opened. Fingers 104 continue to move downwardly over the tubular stock and complete the fold of the edge of the stock theretofore gripped between the fingers. When the edges 113 of the stock are in alignment such that the cuff has been completed folded, the guides 66 and 68 are closed, i.e., retracted away from the sides of the tubular stock. The depending leg 65 of member 64 thereupon engages the cuff A and urges the same off of the guides 66 and 68, and the cuff drops into the chute 116 shown in dotted outline in Fig. 1. Upon falling into chute 116 the cuff then slides down to the conveyor 118. The finger assemblies 96 and 98 continue their movement and pick up the next piece of tubular cuff stock and the operation is repeated. A spring or the like 120 may be connected between cam followers 108 and fixed fingers 104 to normally tension the fingers together.

The cuff-forming machine hereinabove generally described serves to deposit, in the manner mentioned, a succession of glove cuffs in chute 116, from which the cuffs descend to the conveyor 118. With the cuff-forming machine operating at a constant speed, a cuff is deposited in chute 116 at determined time intervals and as a consequence, cuffs are deposited at the intake end of conveyor 118 at determined intervals.

While I have hereinabove referred to a cuff-forming machine which deposits glove cuffs at determined time intervals at the intake end of conveyor 118, it is to be understood that many other types and varieties of machines may be provided at the intake end of conveyor 118 to deposit articles upon the conveyor at determined time intervals. It is necessary only to ensure that the articles to be imprinted by our improved imprinter hereinafter mentioned are deposited with determined regularity upon the intake end of the conveyor. Because shaft 62 is connected to the cuff-forming machine by means of gear train 60, the speed of rotation of shaft 62 is a function of the rate at which cuffs are deposited in chute 116 and thence find their way to conveyor 118. Because the rotation of shaft 62 is a function of the speed at which the glove cuffs are deposited on conveyor 118, shaft 62 provides a means for synchronizing the operation of our improved imprinter with the rate of deposit of the glove cuffs on conveyor 118.

Conveyor

Conveyor 118 is one of the elements of the combina-

tion comprising our improved decal stamping or transfer machine. The conveyor includes an endless belt or the like **120** entrained over rollers **122** and **124** at opposite ends of the imprinter. A conveyor floor **121** extends beneath the upper span of belt **120**. A pair of conveyor guide walls **126** are disposed along opposite sides of the belt **120** and the rollers may be mounted between the side walls after the manner shown in Fig. 3. Roller **124** is connected to a gear **128** over which is entrained the drive chain **130** which extends to gear **132** mounted on shaft **62**. Gears **128** and **132** are so proportioned relative to each other that the conveyor is driven at a speed such that as each glove cuff is deposited at the intake end of the conveyor, it is promptly drawn by the conveyor away from the intake end and toward the transfer or stamping station of our machine. Roller **124** may have a conveyor belt engaging surface which will readily slip relative to the belt such that upon holding the belt against movement the roller will continue to rotate. The purpose of this will be described hereinafter.

Stamping station

The stamping station includes a pair of upstanding laterally spaced apart side frame members **138** and **140** supported at the lower ends on four posts **142** received within the conveyor guide walls **126**. The side members **138** and **140** are held in spaced apart relation by transversely extending members **144** and **146**. Members **144** and **146** are provided with aligned apertures therethrough through which extends a downwardly projecting platen-carrying rod **148** with a platen **150** mounted on the lower end thereof.

The upper end of rod **148** is connected to a cross head **152** adapted to reciprocate between the side members **138** and **140**. The cross head is provided with a pair of spaced upwardly extending members **152** the upper ends of which are connected together by a cam follower **154** having a roller portion **156**. The roller is adapted to bear against a cam **158** mounted on a shaft **160** which extends between and is carried by members **138** and **140**. Shaft **160** is driven by a sprocket **162** mounted on one end thereof with a chain drive **164** entrained over sprocket **162** and extending downwardly and entrained at its lower end over sprocket **166** which is mounted on shaft **62**. Upon each complete revolution of sprocket **162** the cross head **151** and consequently platen **150** is reciprocated. It will be noted that platen **150** descends by virtue of gravity and that cam **158** in no way acts to force the platen downwardly. Suitable wiring schematically indicated at **168** is adapted to heat the platen.

Included in the stamping station is a cuff gate **170** which is mounted on a shaft **172** extending between and supported by conveyor guide walls **126**, with one end of the rod projecting beyond one of the guide walls and provided with a crank **174**. A connecting rod **176** extends from crank **174** upwardly to a cam follower **178** pivotally mounted on support **180**. Support **180** is affixed to side member **140** of the stamping station. The roller **182** on the end of cam follower **178** is adapted to follow a cam **184** mounted on shaft **160**. Upon each complete revolution of cam **184** the gate **170** is swung from a vertical position in which it is disposed as shown in Fig. 5 to arrest movement of a cuff on the conveyor belt **120**, to a horizontal position in which it is disposed to permit a cuff on conveyor belt **120** to pass therebeneath and out of the stamping station.

Disposed beneath the upper span of belt **120** and in alignment with the platen is a floor plate **185** secured between the conveyor guide walls **126**. Upon dropping of the platen toward a cuff on the conveyor, the weight of the platen resting upon the cuff grips the belt **120** against the plate **185** with sufficient force to stop the travel of the conveyor belt. The feed roller **124** of the conveyor continues to rotate but slips within the belt. With the belt held motionless the travel of succeeding cuffs toward the stamping station is thereby interrupted.

It is now apparent that the gate **170** initially stops movement of a cuff to be stamped by holding the cuff in the stamping station, and that after descent of the platen the cuff is held, as well as the conveyor belt and succeeding cuffs, from advancing until the platen is raised. The position of cam **184** on shaft **160** is such that the gate **170** is raised immediately before ascent of the platen or at the time of ascent of the platen so that when the platen is raised the stamped cuff is promptly conveyed out of the station. The right hand end of the conveyor may be disposed to deliver the cuffs to the next succeeding station in the cuff-handling system.

Decalcomania ribbon-supporting and advancing mechanism

As shown in Figs. 1 and 2, mechanism is provided for supporting and advancing a waxed decalcomania ribbon or tape **200** of conventional construction between the heated platen **150** and articles A disposed on the conveyor **118**. The mechanism includes a feed roll **202** of ribbon stock and a take-up roll **204**. Intermediate these two rolls are a plurality of guide rollers and means for feeding the ribbon in a step-by-step movement with a pause following each step. Indicated at **206** is a ribbon-tensioning arm provided with a roller **208**, with the weight of the roller and arm serving to tension the ribbon as shown in Fig. 2. A pair of guide rollers **210** and **212** guide the ribbon upwardly and permit feed thereof over the conveyor. Feed roller **214** mounted on shaft **216**, see Fig. 6, receives the tape from that side of the stamping station opposite guide roller **212**. Roller **214** may be covered with rubber or the like to increase the coefficient of friction between the ribbon and the roller. A tensioning roller **216** mounted on the end of pivotally supported arm **218**, with a spring **220** tensioning the roller upwardly and against tape **200** to squeeze the tape between rollers **214** and **216**, serves to increase the friction of the ribbon about roller **214**.

The take-up roll **204** is mounted upon a shaft **222** which is supported by a friction clutch drive arrangement of conventional construction whereby a limited torque is applied to roll **204**, such that if the ribbon resists take-up movement of roll **204** beyond a predetermined force, the clutch mechanism will serve only to keep the ribbon taut, and when the resistance against take-up of ribbon **200** drops below the predetermined torque load of the clutch, take-up roll **204** will serve to wind the ribbon on the roll. Sprocket **224** is mounted on the clutch mechanism and driven by chain drive **226** entrained at the end opposite sprocket **224** over sprocket **228** mounted on shaft **230**.

As shown in Fig. 1, a sprocket **232** is also mounted on shaft **230** to be driven by chain drive **234** entrained at its opposite end over sprocket **236**. Sprocket **236** is mounted on shaft **238** which extends into the gear box **240**. Also extending into gear box **240** is shaft **242** upon the outer end of which is mounted sprocket **244**. A chain drive **246** connects sprocket **166** on shaft **62** to sprocket **244**, as shown in Fig. 1. The gear box **240** serves to translate the drive of shaft **242** to the angularly related shaft **238** and impart motion to the latter.

A crank **248** is mounted on shaft **238** and is connected directly to actuating rod **252**. Rod **252** extends upwardly to a gear train for intermittently feeding the decal ribbon **200**. Such gear train includes a large ratchet gear **254** together with a smaller gear **256** both of which are mounted on a common shaft **258**. Gear **256** meshes with a gear **260** mounted on shaft **216**.

In order to drive the gears **254**, **256**, and **260** from actuating rod **252**, a ratchet lever is pivotally connected at its outer end to rod **252** and at its inner end to a laterally projecting portion **264** of the frame of our decal transfer machine. Mounted on the lever **262** are three

pivoted fingers or ratchet pawls **266**, **268**, and **270**. The fingers are supported on the common pin **272**. Three springs generally indicated at **274** are connected to the fingers and to the lever as shown in Fig. 4 and serve to tension the fingers toward gear **254**.

Upon rotation of shaft **238**, actuating rod **252** is raised and lowered. When lever **262** is swung upwardly, it serves to engage the fingers **266**, **268**, and **270** with the teeth of gear **254** to turn the gear in a counterclockwise direction as viewed in Figs. 2 and 4. As rod **254** is moved downwardly, lever **262** is pivoted downwardly and the fingers mounted thereon drag over the teeth on gear **254**, and gear **254** remains stationary. In this fashion an intermittent movement is imparted to tape **200**. Such movement is in timed relation with the operation of the cuff-folding machine generally indicated at **20** in Fig. 2, such that the movement of the ribbon is interrupted periodically and at such times as correspond with the movement of a cuff A on conveyor belt **120** into the stamping station. Such timed movement of the step-by-step feed of ribbon **200** with the movement of cuffs on the conveyor, however, does not ensure that a decal on the ribbon will be properly positioned over a cuff in the stamping station at the time of descent of the heated platen **150**. Means are provided for properly positioning the ribbon such that the decals on the tape are positioned immediately above and in registry with a cuff on the conveyor in the stamping station, and in registry with the heated platen.

Decal positioning means

As shown in Figs. 4, 5, 6, and 11, means are provided for properly aligning the decalcomania on the ribbon **200** with a cuff in the stamping station prior to the downward movement of the heated platen to transfer the decal to the cuff. Such means includes a decal position-sensing device comprising an exciter lamp **280** and a photoelectric cell **282** shown in Figs. 5 and 11. Lamp **280** is focused toward cell **282** with sufficient light passing through ribbon **200** to energize the light-sensitive surface **283** in cell **282**. The ribbon **200** is provided, as shown in dotted outline in Fig. 5, with a succession of decals **286** positioned at spaced apart intervals along the length of the ribbon, and is also provided with a succession of opaque dots **288** positioned intermediate the decals. The light from lamp **280** of the sensing device is adapted to pass through the ribbon except when an opaque dot **288** is disposed immediately below portion **280**, in which event light does not reach the photo-sensitive surface **283**.

A conventional photoelectric system is provided in which the lead **284** is connected to the grid circuit of an amplifier tube **286**, and the plate of the photo cell is connected to the cathode circuit of the tube **286** by lead **288**. Lamp **280** is connected to a source of current, as, for example, 110 v. A.C., through an "Off-On" switch **281**, and the heater circuit for tube **286** is connected to a transformer **289** connected in the 110 v. A.C. supply. The plate of tube **286** is connected to relay **290** which actuates normally closed switch **291**.

Switch **291** is in a 110 v. circuit in which a second relay solenoid **292** is in series with switch **291**, and a normally open switch **293**, operated by relay **292**, is in parallel with switch **291**. A solenoid **298** is connected in this 110 v. circuit. Solenoid **298** shown in Figs. 2, 4, and 11, is connected by link **302** to the upper end of arm **304** which is connected at its lower end to the finger shield **306**. Finger shield **306** is pivotally connected to portion **308** of the stamping machine. The shield is arcuately shaped with a portion **310** overlying somewhat less than 90° of the teeth of gear **254**. Upon energization of solenoid **298** to draw the plunger therewithin, the shield is rotated slightly from the solid outline position of Fig. 4 to the dotted outline position.

Upon movement of the shield from the solid to the dotted outline position, the fingers **266**, **268**, and **270** are not permitted to engage the teeth of gear **254** as early during the upward movement of lever **262** as they would if shield **306** was in the solid outline position. This is so for the reason that the shield holds the fingers outwardly away from the teeth of gear **254** until the fingers have passed beyond the upper edge of the shield and can spring toward the teeth of gear **254**. The tip of each of the fingers is spaced from the next adjacent finger tip by an amount substantially one-third of the distance between adjacent teeth on the gear. For this reason, as soon as the fingers have passed over the upper edge of shield **306**, one of them will immediately engage behind one of the teeth of gear **254** and without lost motion between lever **262** and gear **254**, the gear will be rotated. The provision of three fingers instead of just one eliminates the necessity of cutting three times as many teeth in gear **254**.

With the solenoid **298** energized and the shield urged around counterclockwise to its dotted outline position, it is apparent that the amount of rotation imparted to gear **254** upon the upward swinging of lever **262** is not as great as would occur if shield **306** were in the solid outline position. For this reason not as much ribbon will be wound between feed rolls **214** and **216** and therefore the ribbon will not be moved as far as would otherwise occur if shield **306** was in the solid outline position.

The operation of this decalcomania-positioning mechanism is as follows. The ribbon is driven in a step-by-step movement by the lever **248** and connecting rod **252** which move in timed relation with the deposit of articles on the conveyor by virtue of being connected to the drive shaft **62** which turns in synchronism with the cuff-forming machine. However, because there is no assurance that a decalcomania on the ribbon is properly positioned between the heated platen and a cuff on the conveyor, the positioning means heretofore described is provided, and as a decal **286** on the ribbon approaches the platen and a position of proper alignment with the platen, an opaque dot **288** also approaches the light beam emanating from exciter lamp **280** of the sensing device. If the pauses following each step of intermittent feed of ribbon **200** occur when the decal **286** is properly aligned with the platen, the opaque dot **288** will not have as yet reached the light beam from lamp **280** of the sensing device, and as a result the photosensitive surface in cell **282** will remain energized and will maintain a negative charge on the grid of tube **286**. This charge will repel the flow of electrons from the cathode to the plate of tube **286** and no current will flow through the relay **290**. With no current flowing through this relay, relay switch **291** remains open and solenoid **298** remains inoperative.

However, if a decalcomania **286** on ribbon **200** should pass beyond a position of proper alignment with the platen before the movement of ribbon **200** is interrupted, the opaque dot **282** will interrupt the light beam from lamp **280** and thereupon the grid in tube **286** will cease to repel electrons and current will flow through relay **290** closing switch **291** thereby serving to energize solenoid **298** and relay **292**. Upon energization of relay **292**, its switch **293** is closed serving to maintain the circuit to solenoid **298** closed after switch **291** opens when relay **290** is de-energized. Upon energization of solenoid **298** the shield **306** will be rotated to the dotted outline position and upon the next succeeding movement of the ribbon **200**, its movement will not be as great. In other words, the decal next approaching the platen will not be moved as far as was the previous decal. In this fashion the position of decalcomania on the ribbon is properly aligned with the platen by correcting the amount of movement of ribbon **200** so that the movement thereof is interrupted at the time that a decal is properly positioned beneath the platen. Solenoid **298** is de-energized following the engagement of fingers **266**—**270** with the teeth of gear **158** by cam **312** opening switch **256**.

In the event that the recals are properly positioned

beneath the platen without correction by the positioning means, as the opaque dots **288** interrupt the light beam following each stamping operation and therefore tend to energize solenoid **298**, the cam **312** opens switch **256** and breaks the circuit to solenoid **298**.

It is now apparent that the above-described embodiment of our invention functions in timed relation with the operation of the cuff-folding machine and therefore in timed relation with the deposit of cuffs on the conveyor. With the speed of the conveyor being predetermined such that a cuff is presented to the stamping station immediately prior to a stamping operation, the presence of a cuff in the stamping station at the time of the stamping operation is assured if the cuff-forming machine is functioning properly to deposit cuffs on the conveyor at constant intervals.

It is also apparent that the movement of a cuff into the stamping station is arrested by the gate **170** and that during the stamping of the cuff, the movement of the conveyor is interrupted by the weight of the heated platen. It will also be recalled that the descent of the heated platen occurs by virtue of its own weight. As a consequence, if more than one cuff should enter the stamping station at the same time, there will be no damage to the ribbon **200** by having the platen forced against the cuffs as would occur if a positive direct drive between the platen and the cam **158** were employed.

It is also to be noted that while the intermittent feed of the ribbon **200** is synchronized with the operation of the platen and the cuff-forming machine, the movement of the ribbon is modulated by the sensing device to decrease, when necessary, the distance the ribbon moves during its step-by-step movement, thereby to ensure alignment of the decals on the ribbon with the heated platen.

Modification

In Figs. 12–14, we have schematically shown a modification of the hereinabove described decal stamping machine. Such modification is similar to the above-described machine except as hereinafter described. Reference numerals are primed when indicating parts corresponding with previously described parts. In this modification the stamping of an article in the stamping station is made dependent upon the presence of an article in the stamping station in a position to be stamped, and the proper alignment of a decal on the transfer ribbon beneath the heated platen. When these two conditions are existent, an article is stamped. This differs from the aforementioned embodiment shown in Figs. 1–11 where the stamping is dependent upon the rate of operation of some other machine in the article-handling system, as, for example, a cuff-forming machine, and where the stamping may occur without regard to the actual presence of an article in the stamping station or a decal properly aligned beneath the platen.

In the embodiment shown in Figs. 12–14, the decal ribbon **200**^{1} is advanced in a step-by-step manner with a pause following each step, and when the pauses in the intermittent feed of the ribbon occur, a decal thereon is positioned immediately below the heated platen **150**^{1}. Articles A on conveyor belt **120**^{1} move into the stamping station, and when an article is properly positioned in the stamping station, and a decal is positioned beneath the platen, the platen **150**^{1} is lowered against the decal on the tape to carry the decal against the article to stamp the same. Unless there is an article in the stamping station in the proper position to be stamped, the platen will not be lowered. Similarly, if a decal on ribbon **200**^{1} is not disposed immediately below platen **150**^{1}, the platen will not be lowered.

The decal transfer ribbon **200**^{1} is fed from a supply roll **202**^{1}, as shown in Fig. 12, over a guide roll **212**^{1} and between the heated platen **150**^{1} and the conveyor belt **120**^{1}. The ribbon passes over a guide roller **320**, beneath a tensioning roller **322**, over a guide roller **324**, and thence to the take-up roll **204**^{1}. The take-up roll **204**^{1} is mounted on a slip clutch as hereinabove described.

The floor plate **185**^{1} of the article conveyor is cut away as at **358**, as shown in Fig. 13, immediately below the stamping station, for a purpose hereinafter mentioned.

Disposed immediately above guide roller **320** is a ribbon brake solenoid BS having a brake shoe **328** at the lower end of the plunger of the solenoid. Upon energization of solenoid BS the plunger is extended downwardly to force the shoe **328** against the ribbon and grip the ribbon between the shoe and roller **320** to interrupt movement of the ribbon. Upon sudden stoppage of the ribbon, the tension roll **322**, mounted on bracket **330** which is freely slidable in a guideway formed in a portion **332** of the frame of the stamping machine, will rise and cushion the initial shock. While the ribbon is held motionless the slip clutch mounting take-up roll **204**^{1} will slip.

The heated platen **150**^{1} is mounted on the lower end of the rod **148**^{1}, the upper end of rod **148**^{1} being connected, for example, to the plunger **334** of solenoid PS. When solenoid PS is energized, the platen **150**^{1} is raised away from the conveyor, and when de-energized, the platen is free to fall by its own weight toward the conveyor.

The article gate **170**^{1} is actuated by a solenoid GS connected to rod **176**^{1}. Upon energization of solenoid GS, the gate **170** is swung downwardly to prevent an article in the stamping station from leaving the station, and when de-energized, the gate is swung upwardly to permit the article to pass out of the station.

In order to effect energization of solenoids PS, GS, and BS, suitably arranged photoelectric cells are disposed adjacent the article conveyor and adjacent the decal transfer ribbon to effect the closure of certain switches in the electrical system connected to the solenoids. The control circuits for these photoelectric cells are not shown in detail for they are of conventional construction and arrangement. The control circuits are shown generally in Fig. 14 and indicated by the letters E_1, E_2, E_3, and E_4. Within each of these control circuits is a switch adapted to be closed when the photoelectric cells associated with such circuits are de-energized by the interruption of the light beam normally falling upon such cells. The schematic wiring diagram of Fig. 14 is adapted to furnish 110 v. current or the like to the control circuits and to the solenoids of PS and BS.

As an article A moves in Fig. 13 on the article conveyor belt **120**^{1} from left to right, it first intercepts the light beam from an exciter lamp **352** focused on photoelectric cell **354**. Photoelectric cell **354** is disposed at the entrance to the stamping station. The control circuit for cell **354** is indicated in Fig. 14 at E_1. Upon interruption of the light beam to cell **354** by an article on the conveyor, a switch in circuit E_1 is closed permitting the flow of current through lead **346**. In series in lead **346** with control circuit E_1 is a relay solenoid R_1 and the gate solenoid GS. Relay solenoid R_1 and gate solenoid GS are energized upon the closure of the switch in control circuit E_1, and the gate 170_1 is moved to a position to prevent the article from leaving the stamping station. Relay solenoid R_1 on being energized closes normally open relay switch R_1S to effect the continuance of flow of electric current through solenoid GS after the control switch in control circuit E_1 has been opened by the passage of the article completely through the light beam from exciter lamp **352**.

The article now in the stamping station approaches the gate **170**^{1} and intercepts a light beam from an exciter lamp similar to exciter lamp **352**, and which light beam is focused upon photoelectric cell **348**. Cell **348** is connected to the control circuit E_2 shown in Fig. 14. Control circuit E_2 is in series with the relay R_3 whose normally closed relay switch R_3S is in series with the

platen solenoid PS. Upon the interruption of the light beam falling upon cell 348, a switch in circuit E_2 is closed. Such switch remains closed as long as the article A remains in the stamping station. The article is held in the stamping station by gate 170[1].

While the article is disposed in the stamping station in a position to be stamped, the platen 150[1] will not be lowered until a decal on the transfer ribbon 200[1] is properly aligned with platen 150[1]. The opaque dots 288, hereinabove mentioned, are disposed to interrupt light beams emanating from exciter lamps 338 and 339 disposed along the path of travel of ribbon 200[1]. Disposed below the translucent ribbon 200[1] and opposite lamps 338 and 339 are the photoelectric cells 340 and 341. The cells are spaced apart a distance such that an opaque dot on ribbon 200[1] will first intercept the light beam from lamp 339 and will thereafter intercept the light beam from lamp 338 before a succeeding dot intercepts the light beam from lamp 339. Cell 340 is positioned such that when an opaque dot intercepts the light beam from lamp 338, a decal on ribbon 200[1] will be properly positioned beneath heated platen 150[1].

Assuming that the ribbon brake solenoid BS is de-energized and that therefore brake shoe 328 is raised from ribbon 200[1], the ribbon will move in the direction of the arrows shown in Fig. 12. The slip clutch, supporting take-up roll 204[1], may be driven by any suitable source of power, such as an electric motor, not shown. An opaque dot on ribbon 200[1] approaches the light beam from lamp 339 and intercepts the beam, de-energizing photoelectric cell 341. Upon de-energization of cell 341 control circuit E_3 connected thereto closes a switch in the circuit and permits the flow of electric current through lead 360 to relay solenoid R_2 and also to the control switch of control circuit E_4. Relay solenoid R_2 is connected to relay switch R_2S which is connected in parallel with control circuit E_3. After the opaque dot has passed completely through the light beam from lamp 339, the relay switch R_2S will maintain the flow of electric current through lead 360. The opaque dot now approaches and intercepts the light beam from lamp 338 thereby serving to de-energize the photo cell 340. Upon de-energization of cell 340, control circuit E_4, connected thereto, will close its control switch which will permit the flow of current through lead 362 in Fig. 14. Upon passage of current through lead 362, the brake solenoid BS, connected in series with control circuit E_4, will be energized. This will serve to move brake shoe 328 downwardly to grip ribbon 200[1] and interrupt the movement of the ribbon.

Switch R_1S_1 is operated by relay solenoid R_1 hereinabove mentioned, and is closed upon energization of relay solenoid R_1. With switch R_1S_1 closed and with current flowing through lead 362, the platen-actuating solenoid PS is de-energized by the opening of normally closed switch R_3S in response to energization of relay R_3. This will permit the platen 150[1] to fall toward the decal ribbon and carry a decal thereon against the article in the stamping station.

A limit switch 364 is disposed within the cutout portion 358 of the floor plate 185[1] of the conveyor as shown in Fig. 13. As shown in Fig. 14, switch 364 is connected between the source of 110 v. current and the solenoids GS and BS and the various control circuits E_1–E_4. Switch 364 is a normally closed switch which is opened by the deflection of conveyor belt 120[1] under the weight of heated platen 150[1] resting against an article A disposed therebeneath and upon belt 120[1]. When platen 150[1] descends to accomplish the decalcomania transfer to an article upon the belt, and with the platen resting upon the article, the belt is deflected downwardly in the cutout portion 358 of conveyor floor plate 185[1] to open switch 364 and interrupt the flow of current to relays R_1, R_2, and R_3. Upon interruption of current flow to relay R_1, relay switches R_1S and R_1S_1 are opened and solenoid GS is energized. Upon de-energization of relay solenoid R_2, relay switch R_2S is opened thereby interrupting the flow of current to solenoid BS. Thereupon the brake shoe 328 is raised from the transfer ribbon, the platen 150[1] is elevated, and the article gate 170[1] is swung upwardly away from a position holding an article beneath the platen to permit such article to pass out of the stamping station upon conveyor belt 120[1]. The operation is thereafter repeated, with the next successive decal on the transfer ribbon and the next successive article on the article conveyor.

It is apparent that the decal stamping machine shown in Figs. 12–14 is not dependent for its operation upon the operation of other machines in the article-handling system, but is dependent directly upon the presence of an article in the stamping station, and the presence of a decal on the transfer ribbon immediately below the platen. Because of this, such machine may be readily inserted in an article-handling system without the necessity of connecting the machine to another machine in the system. In addition, the transfer machine will not move the platen toward the conveyor unless an article is disposed below the platen, nor will the platen be lowered unless a decal is properly positioned below the platen. For this reason the machine is particularly suited for use where articles on the conveyor do not approach the stamping station at uniform time intervals or which are not spaced apart at successive equal distances from one another.

It is apparent that various combinations and permutations of the primary embodiment and modification hereinabove described may be made without departing from the spirit of the invention.

What we claim is:

1. A decalcomania transfer machine comprising: an article conveyor; a heated platen disposed above the conveyor for movement toward and away from articles on the conveyor; decalcomania ribbon-actuating mechanism disposed to feed a decalcomania ribbon in a uniform step-by-step movement with a pause following each step, between the platen and articles on the conveyor, said mechanism including means for varying the length of each step-by-step movement; means coupled with the platen and with said mechanism and operable to move the platen toward and away from articles on the conveyor during the pause following each step-by-step movement of a decalcomania ribbon supported and advanced by said mechanism; a gate disposed adjacent the conveyor and swingable from a position interrupting movement of an article on the conveyor to a position permitting continued movement of the article on the conveyor; means coupling the gate with the first-mentioned means to synchronize the movement of the gate and platen; and sensing means coupled with said means for varying the length of each step-by-step movement of said mechanism and operable to sense misalignment with the platen of decalcomania on a ribbon supported and advanced by said mechanism, during each pause in the step-by-step advance of the ribbon, and initiate operation of said varying means to cause a variation in the length of the step-by-step feed thereby aligning succeeding decalcomania on the ribbon with the platen during subsequent step-by-step movements of the ribbon.

2. A decalcomania transfer machine comprising: an article conveyor; a heated platen disposed above the conveyor for movement toward and away from the conveyor; means coupled with the platen for actuating the same; means for guiding a decalcomania transfer ribbon between the platen and articles on the conveyor; ribbon-advancing mechanism including a feed roll over which a decalcomania ribbon may be entrained; a ratchet wheel coupled with the feed roll; a ratchet lever; mechanism coupling the lever with the means for actuating the platen to synchronize the movements thereof; a ratchet pawl mounted on said lever to engage the ratchet wheel;

means selectively operable to prevent engagement of the pawl and wheel during a portion of the movement of the lever; and means for sensing the position, relative to said platen, of decalcomania on a transfer ribbon, and coupled with the means for preventing engagement of the ratchet pawl, and operable upon sensing misalignment of decalcomania on the ribbon with respect to said platen to actuate said means for preventing engagement of the ratchet pawl to effect withholding of the pawl from the wheel during a portion of the movement of the lever.

3. A decalcomania transfer machine comprising: conveyor means for advancing a succession of articles to be stamped, a heated platen disposed above the conveyor for movement toward and away therefrom, means coupled with the platen for actuating the same, decalcomania transfer ribbon-advancing and supporting mechanism adapted to support a decalcomania transfer ribbon for movement between the platen and the conveyor and including means for effecting a step-by-step advance of the ribbon, ribbon-position correction means coupled with said means for effecting the step-by-step advance of the ribbon and operable to sense misregistry of decalcomania on the ribbon between the pauses in the step-by-step advance thereof and modulate succeeding operation of said mechanism until successive decalcomania on the ribbon are again in registry with the platen during the pauses in the step-by-step advance of the ribbon, and said means for actuating the platen coupled with said advancing and supporting mechanism to effect movement of the platen during the pauses in the step-by-step advance of the ribbon.

4. A decalcomania transfer machine comprising: an article conveyor including a conveyor belt and a slip clutch device for driving the belt; a heated platen disposed above the conveyor for movement toward and away therefrom and including means for raising the platen and permitting it to fall by gravity toward the conveyor; decalcomania transfer ribbon-supporting and advancing mechanism coupled with said means and operable in timed relation with the movement of the platen to feed a transfer ribbon in a step-by-step movement between the platen and articles on the conveyor; said platen being operable upon movement toward the conveyor to carry a ribbon supported by said mechanism against an article on the conveyor with the weight of the platen upon the article increasing the frictional force opposing the motion of the belt beyond the limiting friction of said clutch device to interrupt movement of the belt, and upon movement of the platen upwardly away from the belt the frictional force opposing movement of the belt being reduced below the limiting friction of the clutch device to permit continued movement of the belt.

5. A decalcomania transfer machine comprising: an article conveyor, a heated platen disposed above the conveyor and movable toward and away from articles thereon, decalcomania ribbon-supporting and advancing mechanism disposed to feed a decalcomania transfer ribbon between the platen and articles on the conveyor, first sensing means coupled with said mechanism and disposed adjacent a ribbon supported and advanced by said mechanism and operable to sense the presence of a decalcomania on the ribbon beneath the platen and simultaneously interrupt movement of the ribbon, a gate disposed adjacent the conveyor and movable from a position preventing movement of an article beneath the platen to a position permitting continued movement of an article from beneath the platen, means coupled with the gate for actuating the same, second sensing means coupled with the means for actuating the gate and disposed adjacent the conveyor and operable to sense the presence of an article on the conveyor when disposed immediately below the platen to initiate movement of the gate to a position interrupting movement of the article,

and platen-actuating means coupled with the first and second sensing means and responsive to the simultaneous sensing thereby of the presence of a decalcomania and an article beneath the platen to move the platen against the ribbon and stamp the decalcomania upon the article on the conveyor.

6. A decalcomania transfer machine comprising: an article conveyor; a heated platen disposed above the conveyor for movement toward and away from articles on the conveyor; decalcomania ribbon-actuating mechanism disposed to feed a decalcomania ribbon in a step-by-step movement with a pause following each step, between the platen and articles on the conveyor in timed relation with the movement of articles on the conveyor; means coupled with the platen and with said mechanism and operable to move the platen toward and away from articles on the conveyor to stamp the platen against the ribbon over an article on the conveyor during the pause following each step-by-step movement of a decalcomania ribbon supported and advanced by said mechanism; and ribbon position correction means for sensing the position relative to the platen of decalcomania on a ribbon supported and advanced by said mechanism, said correction means coupled with the ribbon supporting and advancing mechanism and responsive to misalignment of a decalcomania on the ribbon with the platen during the pauses in the step-by-step advance of the ribbon to momentarily withhold operation of said mechanism to vary the amount of travel of the ribbon during succeeding step-by-step movements until the decalcomania on the ribbon are again aligned with the platen during the pause following each step-by-step movement of the ribbon.

7. A decalcomania transfer machine comprising: an article conveyor; a heated platen disposed above the conveyor for movement toward and away from the conveyor; means for guiding a decalcomania transfer ribbon between the platen and articles on the conveyor; a ribbon feed roll over which a decalcomania ribbon is entrained; means coupled with the feed roll for driving the same determined uniform increments in step-by-step rotation; modulating means coupled with the drive means for varying the uniform driving increments thereof; means for sensing the position, relative to said platen, of decalcomania on a transfer ribbon; and said modulating means coupled with the sensing means and responsive to the misregistry of decals with respect to the platen to vary uniformly subsequent drive increments of the driving means and correct the misregistry.

8. A decalcomania transfer machine comprising: an article conveyor, a platen disposed above the conveyor for movement toward and away from articles on the conveyor, means for guiding a decalcomania transfer ribbon beneath the platen for impression upon articles on the conveyor by the platen, a feed roll over which the transfer ribbon is entrained, drive means intermittently operable in synchronism with the movement of articles on the conveyor to index the feed roll a determined number of revolutions, clutch means between the drive means and the feed roll for coupling the drive means to the feed roll at the beginning of each operation of the drive means, sensing means coupled to the clutch means for sensing misregistry of decalcomania on the ribbon relative to the platen at the end of each indexing of the feed roll and operable to cause said clutch means to momentarily withhold coupling of the drive means to the feed roll at the commencement of the succeeding operation of the drive means to allow partial operation of the drive means before the same is coupled to the feed roll thereby reducing the amount of indexing of the feed roll.

9. A decalcomania transfer machine comprising: an article conveyor; a heated platen mounted for movement toward and away from articles on the conveyor; means for guiding a decalcomania transfer ribbon beneath the platen; a ribbon feed roll over which the decalcomania

ribbon is entrained; intermittently operative drive means coupled with the platen to drive the feed roll in a step-by-step rotation in synchronism with platen movement, said drive means having a selectively operative delayed motion connection with the feed roll to momentarily delay coupling of the feed roll to the drive means during a portion of the movement of the drive means in each step of the step-by-step motion or inoperative to delay coupling; and means for sensing misregistry relative to said platen of decalcomania on the transfer ribbon, and coupled with the selectively operative delay motion connection to actuate such connection upon sensing misregistry.

10. A decalcomania transfer machine comprising: an article conveyor; a heated platen disposed above the conveyor for movement toward and away from articles on the conveyor; a feed roll about which a decalcomania ribbon is entrained for movement; means for guiding the ribbon beneath the platen; step-by-step drive means operable in synchronism with movement of articles on the conveyor to drive the feed roll in step-by-step increments of rotation; means for coupling the drive means to the feed roll to rotate the roll during each step-by-step operation of the drive means, said coupling means selectively operable to momentarily withhold driving engagement of the driving means from the feed roll during selected driving steps of the step-by-step movement of the drive means to reduce correspondingly the rotation of the feed roll; means operatively connected with the coupling means for sensing misregistry of decalcomania on the ribbon with respect to the platen and operative upon sensing misregistry to actuate said coupling means to momentarily withhold driving engagement between the driving means and the feed roll to decrease rotation of the roll during subsequent step-by-step operation of the driving means.

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